

**Oroville Facilities Relicensing Efforts
Environmental Work Group
Draft Narrative Reports for Resource Action Discussion**

Resource Action: EWG-5

Task Force Recommendation Category: 1

**Structurally Modify Sunset Pumps and/or Shanghai Bench to Facilitate Passage
of Sturgeon and Shad**

Date of Field Evaluation: Based on observations made by the sturgeon passage field assessment team in July, 2003 for the F3.2 Task 3A report.

Evaluation Team: Richard Harris, Brad Cavallo, David Olson and Koll Buer

Description of Potential Resource Action:

The goal of this proposed Resource Action is to physically modify Sunset Pumps and/or Shanghai Bench so that they don't impede upstream passage of sturgeon or American shad at low flows.

Nexus to the Project:

Neither Sunset Pumps nor Shanghai Bend are located within the FERC project boundaries. The Oroville project controls flows down to Sunset Pumps and significantly contributes to the cumulative flows at Shanghai Bench, therefore it influences the conditions that affect the ability of fish to pass these potential impediments. The Oroville project's contribution and influence of flows and the passability of these features is the only project nexus to the fish passage for this proposed Resource Action. Shanghai Bench is a natural geologic formation and a historical fish passage impediment that predates the Oroville project. Sunset Pumps is an agricultural diversion point and the wing dam structure that is the potential passage impediment was recently significantly altered to increase shear velocities over their intake screens. The modification of the wing dam and the resulting velocity conditions are likely much more of a factor to fish passage than the actual flows released from Oroville. Since this instream structural modification must have required permits and agency reviews for biological impacts and the modification was subsequently conducted, then the conclusion must have been that fish passage was not considered to be an issue at these facilities. Additional investigation into the permits and pre-construction and design assessments for Sunset Pumps is recommended to gain an understanding of the fish passage considerations from the perspective of this facility.

Potential Environmental Benefits:

The potential benefit of this measure would be improving the accessibility of sturgeon and shad in the Feather River upstream of the barriers. Data are not currently available for quantifying these potential benefits nor the extent of the current problems with fish passage. American shad have been documented successfully passing Shanghai Bench even at critically low flows, so modification of this barrier would likely not substantially benefit shad. Consideration should be given to the potential interrelationships between increased habitat availability to sturgeon and shad and expected productivity (i.e. How much increased production would there likely be with increased available habitat?). The amount of sturgeon spawning habitat that would be

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made accessible by providing more consistent passage above Sunset Pumps has not been determined. However, it appears that at least some suitable sturgeon habitat is available upstream of Sunset Pumps.

Potential Constraints:

There are no particularly serious physical constraints to this measure. Permitting and the cooperation of the Sunset Pumps facility to physically modify their wing dam would be required. Cost could potentially be an issue, depending on how substantial the remedial measure would be to provide for fish passage. Physical modification of Shanghai Bench may positively or negatively effect recreation, fish habitat and navigability of the waters. Modification of Sunset Pumps may reduce the effectiveness of the function of the wing dam and potentially negatively affect the sweeping velocities on the intake fish screens.

Existing Conditions in the Proposed Resource Action Implementation Area:

Both Sunset Pumps and Shanghai Bench may impair upstream passage of sturgeon at some flows. Sunset Pumps may impede passage of shad at some flows. These features are not an obstruction to passage of anadromous salmonids.

Sunset Pumps is a rock and rubble dam spanning the river. At lower flows (<2,000 cubic feet/second (cfs)), water is focused through a notch in the structure in a high velocity chute. The high velocities may be greater than the swimming abilities of sturgeon and shad. At low flows, the remainder of Sunset Pumps presents a height barrier that exceeds the typical jumping ability of sturgeon and shad. Sunset Pumps may have a “sneak passage” on the river left side through some willows that might provide passage in low flows that were observed in the July field investigations. This area could potentially be a candidate for some enhancement to facilitate potential fish passage.

Shanghai Bench is a natural rock ledge. At lower flows (<2,000 cfs) low water depths across the Bench may impair passage of sturgeon although due to limitations in the availability of sturgeon passage performance capabilities, this assessment is not definitive. The passage assessment team concluded that Shanghai Bench was likely passable at higher flows and antidotal observations of sturgeon above this barrier after high flows substantiates that this is likely accurate.

The periods of spawning for the two species are May-June for shad and February-June for sturgeon. During those times, required minimum flow releases range from 1,000 to 1,700 cfs, depending on the month and water year type. These flow minimums may not be adequate for fish passage.

Design Considerations and Evaluation:

The choices for improving passage at the two locations include:

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- Blasting a section of Shanghai Bench to enhance the depth and proportional flow of the slough on the river left portion of the bench.
- Adding fish passage facilities (e.g. ladders) at either location
- Creating alternative routes of passage around Sunset Pumps (e.g. enhance the existing “sneak passage” or build a “natural fish passage way” in the same area with stair stepped pools).
- Modifying the existing notch at Sunset Pumps to reduce velocities that would be passable by these fish species burst swimming speed.

An alternative to this physical modification proposal is EWG-4A to provide pulsed flows, e.g. >2,000 cfs periodically while fish are migrating to allow passage (between February-June). This is mentioned in the description of Resource Action, EWG-4A (i.e., pulsed high flows could reduce holding time below Sunset Pumps and Shanghai Bench). The feasibility and potential effects of this option would require further analysis.

Regardless of the option chosen, no adverse geomorphic effects would be anticipated.

One consideration that would apply to use of ladders would be concern over poaching. Presumably, this could hopefully be minimized through design and monitoring.

Synergisms and Conflicts:

Improving passage through physical changes to one or both locations would appear to be a relatively isolated measure. To provide benefits, both should be modified, although they might be treated differently. This measure would be synergistic with Resource Actions EWG-4A and EWG-4B that also seek to improve fish passage and attraction flows for sturgeon and shad. In fact, all these measures (EWG-4A, EWG-4B, and EWG-5) should probably be considered together since they are so interdependent.

Any structural modification of Sunset Pumps should also consider the possibility of including a fish identification and counting system. This would make it possible to evaluate the effectiveness of passage enhancement, and would also compliment efforts to monitor abundance and migration timing of anadromous fishes (EWG-2A).

Physical modification of Shanghai Bench may positively or negatively effect recreation, fish habitat and navigability of the waters.

There could potentially be conflicts with the operations at Sunset Pumps. Permitting and the cooperation of the Sunset Pumps facility to physically modify their wing dam would be required. Modification of Sunset Pumps may reduce the effectiveness of the function of the wing dam and potentially negatively affect the sweeping velocities on the intake fish screens.

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Uncertainties:

One current limitation identified in the F3.2 Task 3A report on sturgeon passage is the lack of available information on sturgeon swimming and passage performance information. A fish swimming performance study by University of California, Davis, is also due (date uncertain). How to design a physical passage modification to reliably benefit the sturgeon passage remains uncertain until a better definition of their passage capabilities has been defined.

A natural fish way passage on Sunset Pumps may require rebuilding or periodic maintenance after high flow events, which could affect its viability as a consistently effective passage solution. This potential requirement also causes some uncertainties in the associated O&M costs.

There is also uncertainty related to the potential benefits in terms of solving a currently unquantified problem and for providing increased spawning activity and production of the two species.

Cost Estimate:

Costs for implementing this measure would vary depending on the option chosen. The least expensive physical modification options would probably be blasting Shanghai Bench and modifying the existing notch at Sunset Pumps. Fish ladders and construction of new channels would be the most expensive options.

Recommendations:

- Final action on this Resource Action should await the findings of the fish swimming performance study by UC-Davis so that the possibility of these features can be more definitively defined.
- The option of improving passage through flow management only should be further evaluated in terms of effects on project operations and benefits and in conjunction with other flow management related proposed Resource Actions.

Additional investigation into the permits and pre-construction and design assessments for Sunset Pumps is recommended to gain an understanding of the fish passage considerations from the perspective of this facility.